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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/780,488	02/17/2004	Steven G. Goebel	GP-304183	1553

7590 05/31/2007  
CARY W. BROOKS  
General Motors Corporation  
Legal Staff, Mail Code 482-C23-B21  
P.O. Box 300  
Detroit, MI 48265-3000

EXAMINER
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YUAN, DAH WEI D

ART UNIT	PAPER NUMBER
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1745

MAIL DATE	DELIVERY MODE
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05/31/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/780,488

Applicant(s)

GOEBEL, STEVEN G.

Examiner

Dah-Wei D. Yuan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) 1-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 18-25 is/are rejected.
- 7) ☒ Claim(s) 26 and 27 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 05182004,12072004.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

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**FUEL CELL SHUTDOWN AND STARTUP USING A CATHDOE RECYCLE LOOP**

Examiner: Yuan

S.N. 10/780,488

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May 25, 2007

***Election/Restrictions***

1. Applicant's election with traverse of Group IV, claims 18-27, in Paper filed May 3, 2007 is acknowledged. The traversal is on the ground(s) that no serious burden on the examiner to search the three distinct inventions. This is not found persuasive because regardless of search method, invention of different limitations will require different search strategies, and the times to consider the relevancy of collective references would increase proportionally as well. It is also noted that there are more than 2500 patents/applications that are classified in class 429, subclass 13. More than 3200 are in class 429, class 34. A complete and thorough examination of the different subject matter recited in the instant claims would require serious efforts and labors. Therefore, the requirement is still deemed proper and is therefore made FINAL. Therefore, claims 1-17 are withdrawn from consideration.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 18-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cargnelli et al. (US 2004/0146761 A1).

With respect to claim 18,20, Cargnelli et al. teach a method of operating a fuel cell system comprising a fuel cell that includes an anode, a cathode and a membrane, an anode flowpath (20) that includes a anode exhaust recirculation line (60), a cathode flowpath (30) that includes a cathode exhaust recirculation line (40). The humid cathode exhaust stream passes through a hydrogen humidifier (90) in which the heat and humidity is transferred to incoming dry hydrogen in the fuel supply line (20). Cargnelli et al. also teach the cathode exhaust stream can be transport through a bypass line (82) (i.e., discontinue the reaction between hydrogen fuel and recycled cathode exhaust). This can be followed by continued supply of reactants to purge the anode and cathode flowpaths in the fuel cell system. See paragraphs 21,22,25.

The disclosure of Cargnelli et al. differs from Applicant's claims in that Cargnelli et al. do not describe reacting fuel with the recycled cathode exhaust until a voltage measured across the fuel cell reaches a predetermined level. Cargnelli et al. teach it is preferable to humidify hydrogen stream first since anode dew point temperature is desired to be higher than the cathode dew point temperature because water is naturally transferred from the anode to the cathode in the fuel cell. It is preferable to use the cathode exhaust stream to exchange heat and humidity with incoming hydrogen stream first. Furthermore, Cargnelli teaches the cathode exhaust may bypass the incoming hydrogen stream depending on the operation condition of the fuel cell. See paragraphs 35,36. Therefore, it would have been obvious to one of ordinary skill in the art to let the cathode exhaust interact with hydrogen stream in the starting up of the fuel cell followed by bypassing the hydrogen stream, because Cargnelli discloses the hydrogen stream does not need

to be humidified by the cathode exhaust after a particular voltage (or operation condition) is achieved.

With respect to claim 19, the hydrogen humidifier (90) in the Cargnelli reference can be considered as a purge valve disposed therein to effect the selective coupling. See Figure 1.

With respect to claim 21, the anode flowpath is filled with hydrogen after the bypass (82) is undertaken. See Figure 5B.

With respect to claim 22, the cathode flowpath is filled with air after the bypass (82) is undertaken. See Figure 5B.

With respect to claim 23, Cargnelli teaches the recirculation loop can be disabled by activating a cathode outlet drain line (42). See paragraph 23.

With respect to claim 24, it would have been obvious to one of ordinary skill in the art to let the cathode exhaust interact with hydrogen stream in the shutting down of the fuel cell followed by bypassing the hydrogen stream, because Cargnelli discloses the hydrogen stream does not need to be humidified by the cathode exhaust after termination of the fuel cell operation.

With respect to claim 25, Cargnelli teaches the use of cathode exhaust (substantially oxygen-depleted fluid) in the hydrogen humidifier. See Figure 1.

***Allowable Subject Matter***

4. Claims 26,27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and

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any intervening claims. Claims 26,27 would be allowable because the prior art does not disclose or suggest the method further comprising decoupling said anode from said fuel source prior to recycling fluid disposed in said cathode flowpath through said recirculation loop.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dah-Wei D. Yuan whose telephone number is (571) 272-1295. The examiner can normally be reached on Monday-Friday (8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan, can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dah-Wei D. Yuan  
May 25, 2007



DAH-WEI YUAN  
PRIMARY EXAMINER